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the anti-cyclone is a secondary phenomenon—a part of the cyclone. The eclipse cyclone, to keep pace with the eclipse shadow, must continuously have formed within the shadow, and must have dissipated in the rear almost instantly. The motion may thus be considered to have a certain analogy to wave motion.

In the light of his discovery that the brief fall of temperature in the eclipse can produce a well developed cyclone, which accompanies the eclipse shadow at the rate of about 2,000 miles an hour, Clayton believes that the fall of temperature due to the occurrence of night must also produce, or tend to produce, a cold-air cyclone. Since the heat of day produces, or tends to produce, a warm-air cyclone, there must tend to occur, each day, two minima of pressure, one near the coldest part of the day and another near the warmest part of the day, with areas of high pressure between them due to the overlapping of the pericyclones surrounding the cold-air and the warm-air cyclones, respectively. These causes must, in the opinion of the author, produce entirely, or in part, the well-known double diurnal period in air pressure, a question which has long puzzled meteorologists and for which as yet no wholly satisfactory explanation has been offered. The surface winds at Cordoba (Argentina) and at Blue Hill are in general found to be in opposite directions, and to indicate a circulation of the wind around two cyclonic centers passing along the equator, and an outflow from high pressures half way between them.

Clayton's conclusions, which are to be presented in greater detail in a forthcoming *Bulletin of the Blue Hill Observatory*, are of the greatest interest and importance. His explanation of the diurnal variation of the barometer seems to have in it many evidences of being the best yet offered to account for this puzzling phenomenon. Meteorologists will now look forward to future solar eclipses with greatly increased interest because of the importance which Mr. Clayton has shown to be attached to eclipse meteorology. It is to be hoped that Mr. Clayton may have the time and the opportunity to extend his investigation further in connection with previous eclipses.

R. DEC. WARD.

#### THE MAGNETIC SURVEY OF THE UNITED STATES.

ON July 1, 1899, a special division of the Coast and Geodetic Survey Office was created by the Superintendent to take charge of the magnetic survey of the United States and the countries under its jurisdiction, which up to that time had been conducted under the supervision of the Computing Division of the Coast and Geodetic Survey. Since that date magnetic observations, namely, declination, dip and intensity of magnetic force, have been made up to December 31, 1900, at about 500 stations distributed over the United States, Alaska and the Hawaiian Islands. At most of the stations permanent marks have been established for the use of the surveyor. Special consideration has also been given to the needs of the mariner, especially in Alaskan waters, where occur places of pronounced local attraction, affecting the compasses on board ship all the way from one-fourth of a point to four points.

Special stations known as 'repeat,' or 'secular variation' stations, have also been established in different parts of the country. At these, observations will be repeated at stated intervals in order to determine the amount of secular change in the magnetic elements. It is the endeavor whenever possible to establish such stations in the vicinities of colleges and universities, as experience has shown that on college grounds we may hope for a permanency of station for a fairly long interval.

Of special state surveys mention may be made first of the completion of the magnetic survey of Maryland, which was undertaken primarily by the Maryland Geological Survey, with assistance rendered by this Bureau; second, the completion of the magnetic survey of North Carolina, conducted under the joint auspices of this Bureau and the North Carolina Geological Survey; third, the completion of the magnetic survey of West Virginia, and fourth, the completion of the magnetic survey of Iowa.

Fair progress has also been made in the establishment of the Magnetic Base Stations, where the countless variations of the earth's magnetism will be recorded photographically. Thus a temporary magnetic observatory has been in operation at Baldwin, Kansas, since

July 1, 1900, and the buildings for the primary, or principal Magnetic Base Station, located at Cheltenham, Md., 16 miles southeast of Washington, have been completed and the installation of the instruments is now taking place. Special declination readings from 7 A.M. to 4 P.M. have been made at Gaithersburg, Md., since March 22, 1900, and at Sitka, Alaska, since October 1, 1900. The sites for the Magnetic Base Stations at Sitka, Alaska, and near Honolulu, Hawaiian Islands, have been determined and preparations made for the erection of the buildings. It is intended to have these magnetic observatories completed in time for cooperation with the proposed Antarctic expeditions.

Special simultaneous observations have also been made on special days at various times, the purpose of these special observations being to determine over how large an area the variations as recorded at the Base Stations may be regarded as applying.

Various special investigations, both of an experimental and of a theoretical character, have been undertaken, and considerable attention paid to the thorough training of observers and to the proper correlation of the various magnetic instruments. During the fall of 1899 a set of Coast Survey magnetic instruments was compared with the standard instruments at the following foreign observatories: Kew, England; Potsdam, Germany; Pavlovsk, Russia, and Parc St. Maur, France.

The following publications have been issued: Appendix No. 9, giving a general report of the magnetic survey of North Carolina, and Appendix No. 10, on the magnetic work of the U. S. Coast and Geodetic Survey; both appendices appearing in the 'Report of the Survey for 1898-99.' Good progress has also been made with the new edition of the Coast and Geodetic Survey magnetic declination tables and Isogonic charts for the United States and Alaska for 1900, designed especially for the use of surveyors and mariners. There has also been issued recently Bulletin No. 41, giving a general summary of magnetic declinations and of secular variation tables in North Carolina.

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#### *ADVANCE IN FORESTRY LEGISLATION.*

ONE by one the different States are awakened to their duty in providing for the future of our forest supplies. The latest development is the introduction on January 23d of two bills into the Legislature of Michigan, which aim to place the two most needful foundation stones for the future State policy. One bill is a most comprehensive 'Forest Fire Protection Act'; the other recognizes the forest reservation policy by establishing a State Forest Reserve.

There had been previously (in 1899) created a Forestry Commission of three members, and the bills were undoubtedly drawn by that Commission with great care.

The Fire Bill is based, in general principles, upon that in existence in the State of New York, which the writer had formulated in 1885, but is improved in several directions. It provides an organization of town fire-wardens under district forest-wardens, with a single Chief Forest-Warden responsible to the Forestry Commission. It places responsibility carefully and, with rather too much prescriptive detail, tries to meet any possible case. The main improvement upon the New York State law, besides the greater coherency of the organization, is the manner in which the expense is distributed. The State pays the entire expense and then collects three-quarters of it from the counties involved, namely, one-half from the county in which the fire originated, the other half from the counties, in proportion to the area burned over in each. But, if neglect on the part of a fire-warden or a responsible county officer can be proved, the whole charge goes against that county. This provision should create a wholesome solidarity and watchfulness in the whole community.

The State Forest Reserve, or rather several reservations, are to be made up of 'delinquent tax lands' within certain districts of the southern peninsula. The area desirable to reserve is to be determined by the Forestry Commission; future tax sales are to increase this area in a similar manner, and also voluntary contributions by private individuals. A novel idea in favor of educational effort is introduced for the acquirement of additional lands